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Marshall Star, September 14, 2011 Edition

# MARSHALL STAR

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## NASA Announces Design for New Deep Space Exploration System

*NASA news release*

NASA has selected the design of a new Space Launch System that will take the agency's astronauts farther into space than ever before, create high-quality jobs here at home, and provide the cornerstone for America's future human space exploration efforts.

***Image right: Artist concept of SLS on launchpad. (NASA)***

This new heavy-lift rocket-in combination with a crew capsule already under development, increased support for the commercialization of astronaut travel to low Earth orbit, an extension of activities on the International Space Station until at least 2020, and a fresh focus on new technologies-is key to implementing the plan

laid out by President Obama and Congress in the bipartisan 2010 NASA Authorization Act, which the president signed last year. The booster will be America's most powerful since the Saturn V rocket that carried Apollo astronauts to the moon and will launch humans to places no one has gone before.



"This launch system will create good-paying American jobs, ensure continued U.S. leadership in space, and inspire millions around the world," NASA Administrator Charles Bolden said. "President Obama challenged us to be bold and dream big, and that's exactly what we are doing at NASA. While I was proud to fly on the space shuttle, tomorrow's explorers will now dream of one day walking on Mars."

This launch vehicle decision is the culmination of a months-long, comprehensive review of potential designs to ensure the nation gets a rocket that is not only powerful but also evolvable so it can be adapted to different missions as opportunities arise and new technologies are developed.

"Having settled on a new and powerful heavy-lift launch architecture, NASA can now move ahead with building that rocket and the next-generation vehicles and technologies needed for an ambitious program of crewed missions in deep space," said John P. Holdren, assistant to the President for Science and Technology. "I'm excited about NASA's new path forward and about its promise for continuing American leadership in human space exploration."

The SLS will carry human crews beyond low Earth orbit in a capsule named the Orion Multi-Purpose Crew Vehicle. The rocket will use a liquid hydrogen and liquid oxygen fuel system, where RS-25D/E engines will provide the core propulsion and the J2X engine is planned for use in the upper stage. There will be a competition to develop the boosters based on performance requirements.

The decision to go with the same fuel system for the core and the upper stage was based on a NASA analysis demonstrating that use of common components can reduce costs and increase flexibility. The heavy-lift rocket's early flights will be capable of lifting 70-100 metric tons before evolving to a lift capacity of 130 metric tons.

The early developmental flights may take advantage of existing solid boosters and other existing hardware. These flights will enable NASA to reduce developmental risk, drive innovation within the agency and private industry, and accomplish early exploration objectives.

"NASA has been making steady progress toward realizing the president's goal of deep space exploration, while doing so in a more affordable way," NASA Deputy Administrator Lori Garver said. "We have been driving down the costs on the Space Launch System and Orion contracts by adopting new ways of doing business and project hundreds of millions of dollars of savings each year."

NASA elected to initiate a competition for the booster stage based on performance parameters rather than on the type of propellant because of the need for flexibility. The specific acquisition strategy for procuring the core stage, booster stage, and upper stage is being developed and will be announced at a later time.

To learn more about the development of the SLS, visit:

<http://go.nasa.gov/newlaunchsystem>

<http://www.nasa.gov/exploration/home/index.html>

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## **Marshall Center Director Robert Lightfoot's Statement on the Space Launch System**

The NASA Administrator announced today that the agency is ready to begin



Robert Lightfoot, Marshall Center Director  
(NASA/MSFC)

formal design work on the Space Launch System. This new rocket will give the United States a safe, affordable, and sustainable way to pursue a new era of human space exploration. Development and operations costs will be significantly reduced by basing the SLS on technology developed for the Space Shuttle and Constellation programs. In fact, several of the basic components for this new heavy lift launch vehicle are already in various stages of design and testing. By using different combinations of the stages, engines, and boosters, we will have a versatile vehicle that can efficiently carry cargo or people and perform a variety of missions that will maintain NASA's leading role in exploration. I'm extremely proud of all the preliminary design work and other studies that the Marshall Team has participated in over the past year to enable us to reach this milestone. We're ready for the task of making this rocket a reality and continuing this nation's exciting journey. This

effort is going to be a great opportunity and a great challenge. We've got a lot of work ahead of us. But I have complete confidence this team can make it happen.

Robert Lightfoot  
Marshall Center Director

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## NASA Launches Mission to Study Moon from Crust to Core

*NASA news release*

NASA's twin lunar Gravity Recovery and Interior Laboratory (GRAIL) spacecraft lifted off from Cape Canaveral Air Force Station in Florida at 8:08 a.m. CDT Sept. 10 to study the moon in unprecedented detail.

***Image right: NASA's twin GRAIL spacecraft begin their journey to the moon atop an United Launch Alliance Delta II rocket as it rises from Cape Canaveral Air Force Station's Space Launch Complex 17B in Florida. (Thom Baur/United Launch Alliance)***

NASA's Jet Propulsion Laboratory manages the GRAIL mission. It is part of the Discovery Program managed at the Marshall Space Flight Center.

GRAIL-A is scheduled to reach the moon on New Year's Eve 2011, while GRAIL-B will arrive New Year's Day 2012. The two solar-powered spacecraft will fly in tandem orbits around the moon to measure its gravity field. GRAIL will answer longstanding questions about the moon and give scientists a better understanding of how Earth and other rocky planets in the solar system formed.



"If there was ever any doubt that Florida's Space Coast would continue to be open for business, that thought was drowned out by the roar of today's GRAIL launch," said NASA Administrator Charles Bolden. "GRAIL and many other exciting upcoming missions make clear that NASA is taking its next big leap into deep space exploration, and the space industry

continues to provide the jobs and workers needed to support this critical effort."

"This is an exciting day for GRAIL and the Discovery Program overall, said Marshall GRAIL Mission Manager Rick Turner. "In the Program Office, we provide risk-based insight for multiple missions under the Discovery Program umbrella. Each of our missions play a critical role in enabling NASA to return ground-breaking planetary science."

The spacecrafts were launched aboard a United Launch Alliance Delta II rocket. GRAIL mission controllers acquired a signal from GRAIL-A at 9:29 a.m. GRAIL-B's signal was eight minutes later. The telemetry downlinked from both spacecraft indicates they have deployed their solar panels and are operating as expected.

"Our GRAIL twins have Earth in their rearview mirrors and the moon in their sights," said David Lehman, GRAIL project manager at the Jet Propulsion Laboratory. "The mission team is ready to test, analyze and fine tune our spacecraft over the next three-and-a-half months on our journey to lunar orbit."

The straight-line distance from Earth to the moon is approximately 250,000 miles. NASA's Apollo moon crews needed approximately three days to cover that distance. However, each spacecraft will take approximately 3.5 months and cover more than 2.5 million miles to arrive. This low-energy trajectory results in the longer travel time. The size of the launch vehicle allows more time for spacecraft check-out and time to update plans for lunar operations. The science collection phase for GRAIL is expected to last 82 days.

"Since the earliest humans looked skyward, they have been fascinated by the moon," said GRAIL principal investigator Maria Zuber from the Massachusetts Institute of Technology in Cambridge. "GRAIL will take lunar exploration to a new level, providing an unprecedented characterization of the moon's interior that will advance understanding of how the moon formed and evolved."

Lockheed Martin Space Systems in Denver built the spacecraft. Launch management for the mission is the responsibility of NASA's Launch Services Program at the Kennedy Space Center.

For more information about GRAIL, click [here](#) and [here](#).

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## NASA TV Will Broadcast Soyuz Landing Sept. 15

NASA news release



On Sept. 15, NASA Television will broadcast the return to Earth of three crew members who have called the International Space Station home for more than five months.

**Image left: This map of Kazakhstan and the surrounding areas shows the target area for landing Soyuz vehicles. (NASA)**

Expedition 28 Soyuz Commander Alexander Samokutyaev, NASA Flight Engineer Ron

Garan and off-going station Commander Andrey Borisenko will undock from the station's Poisk module to return to Earth in their Soyuz TMA-21 spacecraft. They are set to land on the southern region steppe of Kazakhstan, near the town of Dzhezkazgan, at 11:01 p.m. CDT.

Their return was delayed a week due to the Aug. 24 loss of the unmanned Progress 44 cargo craft.



Expedition 29 NASA Commander Mike Fossum, Russian Flight Engineer Sergei Volkov and Japan Aerospace Exploration Agency Flight Engineer Satoshi Furukawa will remain aboard the complex to conduct research until their planned return to Earth in mid-November.

The schedule to launch three new Expedition 29 crew members, NASA Flight Engineer Dan Burbank, Soyuz Commander Anton Shkaplerov and Russian Flight Engineer Anatoly Ivanishin, is under review as NASA and its international partners assess the readiness to resume Soyuz launches.

The full schedule of the Expedition 28 Soyuz TMA-21 hatch closure, undocking and landing coverage is [here](#). All times are Central Daylight Time.

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## **NASA Successfully Tests Five-Segment Solid Rocket Motor**

*By Dan Kanigan*

NASA and ATK Space Systems successfully completed a two-minute, full-scale test of Development Motor-3, or DM-3, Sept. 8. DM-3 is NASA's largest and most powerful solid rocket motor ever designed for flight.

***Image right: NASA and ATK's five-segment solid rocket motor fires during the Development Motor-3 test in Promontory, Utah, Sept. 8. (ATK)***

The solid rocket motor is managed by the Marshall Space Flight Center.



The stationary firing of the development solid rocket motor was conducted at the ATK test facility in Promontory, Utah. ATK Space Systems is the prime contractor. DM-3 is the third in a series of development motors and the most heavily instrumented solid rocket motor in NASA history with a total of 37 test objectives measured through more than 970 instruments.

Prior to the static test, the solid rocket motor was heated to 90 degrees Fahrenheit to verify and assess motor performance at high temperatures during the full-duration test. This series of testing will certify the motor to fly at temperature ranges between 40-90 degrees Fahrenheit. Initial test data showed the motor performance met all expectations.

"Ground testing at temperature extremes is crucial to furthering our understanding of solid rocket propulsion," said Alex Priskos, first stage manager at Marshall. "These tests will help us build better, more capable solid rocket motors and will allow America to maintain its leadership in this important technical capability."

The solid rocket motor is designed to generate up to 3.6 million pounds of thrust, or lifting power, at launch. Information collected from this test, together with data from earlier development motor tests, will be evaluated to better understand solid rocket propulsion performance, reliability and design.

Although similar to the solid rocket boosters that helped power the space shuttle to orbit, the five-segment development motor includes several upgrades and technology improvements implemented by NASA and ATK engineers. Motor upgrades from a shuttle booster include the addition of a fifth segment, a larger nozzle throat, and upgraded insulation and liner. The motor cases are flight proven hardware used on shuttle launches for more than three decades.

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## NASA Offers 'Back to School' Web Chat Series

NASA news release



School days are here once again, but you don't have to be in a classroom to learn more about the wonders of our world, our solar system and our universe -- just log in from wherever you are!

**Image left: Aerial view seen from the Taurus G4 aircraft, developed by Pipistrel USA. (Pipistrel USA)**

NASA scientists and subject experts are inviting you to a "back to school" science chat series. Every Thursday from Sept. 15-Oct. 20, simply visit the weekly topic links listed [here](#) to ask questions and get answers on a variety of subjects: the exciting Centennial Challenge, unpredictable lightning, our temperamental sun, the fascinating moon, how to land -- and drive -- on another planet and how to race a moonbuggy.

This week's chat is about how innovative companies are coming together in Santa Rosa, Calif., to compete in the third Green Flight Challenge, part of NASA's year-long Centennial Challenge Series. The excitement goes beyond the \$1.65 million of NASA-funded prize money at stake -- the ultimate goal is for energy-efficient, quiet, green-friendly flight solutions for the future.

That may sound simple until you read the stringent rules and specifications. Aircraft in the competition are required to fly 200 miles in less than two hours; reach an average speed of at least 100 mph; take off at a distance of less than 2,000 feet to clear a 50-foot obstacle; deliver a decibel rating of less than 78 dBA at full-power takeoff -- all while using less than one gallon of gasoline per occupant! From a competition field of 10 teams, five have been able to complete all of requirements necessary to enter the competition.

On Sept. 15, Centennial Challenges program manager Sam Ortega will answer your questions about the Santa Rosa Green Flight Challenge. Join the chat by logging on [here](#) a few minutes before 2 p.m. CDT. The chat module will appear at the bottom of the page.

See you in chat!

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## Marshall Cost-Estimating Team Members Recognized

At the [NASA Cost Analysis Symposium](#) Aug. 15-18 in Houston, members of the Marshall Space Flight Center's [Engineering Cost Office](#) were honored for their service to Marshall and the agency.

***Image right: Marshall Center cost engineers, from left, Stanley McCaulley, Andy Prince and Mahmoud Naderi received honors at the annual NASA Cost Analysis Symposium in Houston Aug. 15-18. Not pictured is Scott May. (Emmett Given/MSFC)***



Cost engineer Mahmoud Naderi was recognized as NASA's "Cost Estimator of the Year" for his contributions in support of the [FALCON 9](#), a rocket-powered launch system designed and manufactured by SpaceX to resupply the International Space Station under the [Commercial Orbital Transportation Services](#) program.

Cost engineer Stanley McCaulley received NASA's "Cost Estimating Rising Star" award, presented to NASA estimators under 30 years old for their work and potential for future leadership in the NASA cost-estimating community.

Marshall Cost engineers Andy Prince and Scott May also were recognized as members of NASA's "Cost Estimating Team of the Year" for their role on the Administrator's [Human Exploration Framework Team](#).

"The estimating community at NASA is a very select group of professionals, so recognition by peers is an indication of truly exemplary service for which Mahmoud, Stanley, Scott and Andy should all be commended," said Trish Pengra, Deputy Associate Administrator of the Office of Independent Cost and Program Evaluation at NASA Headquarters in Washington.

The Engineering Cost Office is part of the [Office of Strategic Analysis & Communications](#).

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### Get Free Tickets for Two at U.S. Space & Rocket Center for Museum Day Sept. 24

On Sept. 24, the U.S. Space & Rocket Center is participating in Museum Day, an annual event hosted by Smithsonian Magazine, offering free general admission for two guests. To register for a free ticket for two, click [here](#). Tickets will be emailed. You must present your free ticket to receive free admission for two guests. IMAX and other special exhibits are not included, but available for purchase. For more information on the U.S. Space & Rocket Center, click [here](#).

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